Blast Induced Ore Movement: The missing step in achieving realistic reconciliations

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ABSTRACT

At Tasiast Gold Mine, mine value chain (MVC) reconciliation was implemented using a similar approach to the one developed by Cook (2008). This hybrid approach is based on the widely used f_1 and f_2 denomination proposed by Parker (2011) and improved upon with the most recent developments found in the literature. MVC is a scientific and objective method to determine whether the assumptions built into our predictions are valid to increase the accuracy of forward planning, to ameliorate the knowledge of the orebody, to explain problems and be able to justify improvements to current practices.

Tasiast's MVC was missing a major step in the reconciliation process: dilution related to blast movement. While the blasts were monitored with Blast Movement Monitors (BMMs), it wasn't possible to determine the post-blast tonnage and grade per ore polygon. One of the major drawbacks is the representation of a blast by 2D displacements, when it is an inherently 3D phenomenon. This approach is a reasonable approximation to identify areas of potential dilution and misclassification, but is unable to re-evaluate the pre-blast grade and tonnage. In addition, reconciliation from mine to mill (f_2) doesn't take into account dilution related to blast movement.

OrePro 3D, a software package developed by OreControl Blasting Consultants (OBC) and financially supported by Kinross, takes 3D ore movement into account when calculating the post blast block model. It achieves this by generating a 3D vector field using blast displacements measured by markers in conjunction with the post-blast topography. The software computes the post-blast block models per mining direction defined by the user, and determines the optimal ore polygons for each. This approach is combined with turning band simulations to evaluate the probability of a polygon to be ore.

This paper will present this innovative software and how it is used at Tasiast in combination with geostatistical simulations, to enhance the final destination of the ore polygons and to refine f_2 reconciliations.